

# *The People's Republic of China*

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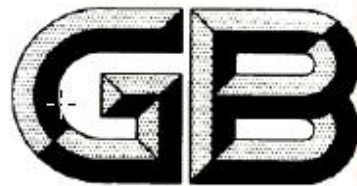
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GB 10457 (2008) (English): Plastic Cling  
Wrap film for keeping food fresh



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# **National Standard of the People's Republic of China**

GB 10457-2008  
Replaces GB 10457-1989

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## **Plastic Cling Wrap film for keeping food fresh**

(Draft for approval)

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Quarantine of the People's Republic of China  
Standardization Administration of the People's Republic of China**

## Foreword

Clause 5 and Section 6.6 of this Standard are mandatory clauses.

This Standard replaces GB 10457-1989 (Cling wrap polyethylene film for keeping food fresh).

Compared to GB10457-1989, the main differences in this Standard are:

- the title of the Standard has been changed from *Cling wrap polyethylene film for keeping food fresh* to *Plastic cling wrap film for keeping food fresh*;
- the scope of the Standard has been expanded from polyethylene cling wrap film to include other plastic cling wrap film;
- the technical requirements for materials have been expanded;
- length deviation has been amended to roll weight deviation;
- gas transmission rate has been amended to deviation of gas transmission rate;
- water vapour transmission has been amended to deviation of water vapour transmission rate;
- markings for the nominal values of the roll weight, gas transmission rate and water vapour permeance have been added;
- marking requirement for materials has been added.

This Standard is proposed by China National Light Industry.

This Standard is under the jurisdiction of the China National Technical Committee of Standardisation for Plastic Products.

The main organisations that participated in the drafting of this Standard:

Institute of Plastics Processing & Application of Light Industry;

Shenzhen Wandajie Plastic Product Co., Ltd;

Shenzhen Junhao Plastic Product Co., Ltd;

National Centre of Testing and Supervision for Quality of Plastic (NTSQP) (Beijing).

The main drafters of this Standard:

Weng Yunxuan, Chen Jiaqi, Chen Qian, Xu Lidang, Wei Wenchang, Su Junming.

This Standard replaces the following previously issued Standards:

- GB 10457-1989.



# **Plastic cling wrap film for keeping food fresh**

## **1 Scope**

This Standard specifies the definitions and terms, product classifications, marking, requirements, test methods, inspection rules, labels, packaging, transport and storage of plastic cling wrap film for keeping food fresh.

This Standard applies to plastic cling wrap film for keeping food fresh (hereinafter referred to as cling wrap film) which is made of resin such as polyethylene, polyvinylchloride, polyvinyl dichloride, processed by the method of monolayer or multilayer extrusion

## **2 Normative references**

The provisions of the following documents become provisions of this Standard after being referenced. For dated reference documents, all later amendments (excluding corrigenda) and versions do not apply to this Standard; however, the parties to the agreement are encouraged to study whether the latest versions of these documents are applicable. For undated reference documents, the latest versions apply to this Standard.

GB/T 1037-1988, Test method for water vapour transmission of plastic film and sheet – Cup method ( NEQ ASTM E96:1980 )

GB/T 1038-2000, Plastic – film and sheeting – Determination of gas transmission – Differential pressure method ( NEQ ISO 2556:1974 )

GB/T 1040.3-2006, Plastic – Determination of tensile properties – Part 3: Test conditions for films and sheets

GB 2410-1980, Transparent plastics – Transmissivity and haze test

GB/T 2828.1-2003, Sampling procedures for inspection by attributes – Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection

GB/T 2918, Plastic-standard atmospheres for conditioning and testing

GB/T 5006.60, Method for analysis of hygienic standard of products of polyethylene, polystyrene and polypropylene for food packaging

GB/T 5009.67, Method for analysis of hygienic standard of products of polyvinyl chloride for food packaging

GB/T 6672-2001, Plastics film and sheeting – Determination of thickness by mechanical scanning

GB 9681, Hygienic standard of products of polyvinyl chloride for food packaging

GB 9685, Hygienic standard for use of additives in food containers and packaging materials

GB 9687, Hygienic standard for polyethylene products used as food containers and tableware

GB/T 16288-2008, Marking of plastic products

GB/T 17030, Polyvinyl dichloride (PVDC) flat-film for food-packaging

QB/T 1130-1991 Plastic determination of right angle tear resistance

### **3 Terms and definitions**

The definitions and terms listed below apply to this Standard.

#### **3.1 Cling wrap film for keeping food fresh**

Film used to pack food. Has the function of self-cling and keeping food fresh or hygienic.

#### **3.2 Polyethylene cling wrap film for keeping food fresh**

A type of food-use cling wrap film which is made of polyethylene (PE).

#### **3.3 Polyvinylchloride cling wrap film for keeping food fresh**

A type of food-use cling wrap film which is made of polyvinylchloride (PVC).

#### **3.4 Polyvinyl dichloride cling wrap film for keeping food fresh**

A type of food-use cling wrap film which is made of polyvinyl dichloride (PVDC).

#### **3.5 Multilayer extrusion cling wrap film for keeping food fresh**

A type of food-use cling wrap film which is processed by the method of multilayer extrusion.

#### **3.6 Self-cling**

The self-cling property of the cling wrap film itself, also called shear and peel strength.

#### **3.7 Open-wrapping**

The degrees of difficulty of removing the film from the paper core during use.

#### **3.8 Anti-fogging**

The property of preventing a cling wrap film from forming any water drops or water fogging on the film surface.

### **4 Classification**

On the basis of the materials and the process techniques, cling wrap film can be divided into polyethylene cling wrap film, polyvinylchloride cling wrap film, polyvinyl dichloride cling wrap film, and multilayer extrusion cling wrap film.

### **5 Marking**

Cling wrap film should have product material markings or variety markings in accordance with GB/T 16288.

For the mass content of any additive which exceeds 1%, the specific name or the chemical structural of the additive must be indicated.

The nominal values of the oxygen transmission rate (unit is  $\text{cm}^3/(\text{m}^2 \cdot 24\text{h} \cdot \text{atm})$ ), the carbon dioxide

transmission rate (unit is  $\text{cm}^3/(\text{m}^2 \cdot 24\text{h} \cdot \text{atm})$ ) and the water vapour permeance (unit is  $\text{g}/(\text{m}^2 \cdot 24\text{h})$ ) of a cling wrap film should be indicated.

The nominal value of the roll net weight of a cling wrap film should be indicated.

Cling wrap film should be marked with the words “for food use”.

Polyvinylchloride cling wrap film should be marked with warnings such as “Must not come into contact with food containing fats”, “Not suitable for microwave heating”, or “Must not be used at high temperatures”.

For cling wrap film that can be microwave-heated, the cling wrap film should be marked with the words “Microwave oven safe”, the heating methods and the maximum safe temperature.

Marking methods can be printing, etc. The mark can be made on the outer packaging of the product or on the product itself.

## 6 Requirements

### 6.1 Materials

#### 6.1.1 Resin

The resin selected should be a food grade material.

#### 6.1.2 Additive

The additives selected and their dosages should meet the provisions set out in GB 9685.

### 6.2 Colour

Cling wrap film should be a transparent, normal natural colour.

### 6.3 Dimensional deviation

#### 6.3.1 Thickness deviation

Table 1 Requirements for thickness deviation

Item		Index
		Thickness limit deviation, mm
Nominal thickness (t), mm	$\leq 0.010$	+ 0.002 - 0.002
	$> 0.010$	+ 0.003 - 0.003

#### 6.3.2 Width deviation

Table 2 Requirements for width deviation

Item		Index
		Width limit deviation, mm
Nominal width (w), mm	$w \leq 200$	$\pm 4$
	$200 < w \leq 400$	$\pm 5$
	$w > 400$	$\pm 6$

### 6.3.3 Roll net weight (mass) deviation

Table 3 Requirements for roll net weight (mass) deviation

Item	Index
Roll net weight (mass) deviation, %	-1

### 6.4 Appearance

The appearance of a cling wrap film should meet the specifications prescribed in Table 4.

Table 4 Requirements for the appearance of cling wrap film

Item	Requirement
Air bubbles, perforations and ruptures	Not permitted
Impurities, number/m <sup>2</sup> > 0.6 mm ≥ 0.3 mm and ≤ 0.6 mm Dispersions, number/10 cm x 10 cm	Not permitted Not permitted to be more than 8 Not permitted to be more than 5
Fish eyes and lump blocks, number/m <sup>2</sup> > 2 mm ≥ 0.2 mm and ≤ 2 mm Dispersions, number/10 cm x 10 cm	Not permitted Not permitted to be more than 20 Not permitted to be more than 5
Degree of evenness	The surface of the film is generally even, few pleats are permissible, a small amount of film edge exceeding the paper core is permissible, but this must not affect the pulling of the film roll out of its box.

### 6.5 Physical-mechanical properties

The physical-mechanical properties of a cling wrap film should meet the specifications prescribed in Table 5.

Table 5 Requirements for physical-mechanical properties

Item	Index			
	PE	PVC	PVDC	Multilayer extrusion
Tensile strength (longitudinal, transverse), MPa	≥ 10	≥ 15	≥ 60	≥ 10
Nominal tensile strain at break (longitudinal, transverse), %	≥ 120	≥ 150	≥ 50	≥ 120
Light transmissivity, %	≥ 90	≥ 92	≥ 90	≥ 90



Haze, %	≤ 3	≤ 2	≤ 3	≤ 3
Right angle tear strength (longitudinal, transverse), N/cm	≥ 40			
Deviation of gas transmission rate – oxygen, %	± 20			
Deviation of gas transmission rate – carbon dioxide, %	± 20			
Deviation of water vapour permeance, %	± 20			
Self-cling (shear and peel strength), N/cm <sup>2</sup>	≥ 0.5			
Open-wrapping	The sample should be able to be completely peeled off within 5 seconds			
Anti-fogging	Under test conditions, no water drops should adhere to the film surface, or only small localised water drops. No water drops should adhere to large areas of the cling wrap film surface.			

## 6.6 Hygienic property

The hygienic properties for polyethylene cling film should meet the provisions set out in GB 9687.

The hygienic properties for polyvinylchloride cling film should meet the provisions set out in GB 9681.

The hygienic properties for polyvinyl dichloride cling film should meet the provisions on hygienic properties set out in GB/T 17030.

The hygienic properties for multilayer extrusion cling film should meet the provisions set out in hygienic standards for corresponding items of the material in direct contact with food. When testing, use the plastic film layer which comes into contact with food to carry out hygienic property tests.

Cling wrap film made of other materials should meet the hygienic property provisions for specific materials set out in the corresponding standards.

## 7 Test methods

### 7.1 Sample conditioning and testing environment

The conditioning of any sample shall be conducted with the standard environment temperature of 23°C± 2°C specified in GB/T 2918, and the test shall be conducted under these conditions. The conditioning time shall be longer than 4 hours.

### 7.2 Dimensional deviation

#### 7.2.1 Thickness

The measurements of the thickness shall be conducted in accordance with the provisions set out in GB/T 6672-2001 in order to determine uniform measurements for 10 spots along the width direction

of the plastic cling wrap film. The thickness limit deviation shall be determined by formula (1).

$$\Delta_t = t_{\min \text{ or } \max} - t_0 \dots\dots\dots(1)$$

in which,

$t_{\min \text{ or } \max}$  -- The actual measured maximum or minimum value, in millimetres (mm)

$t_0$  – The nominal thickness, in millimetres (mm)

$\Delta_t$  – The thickness limit deviation, in millimetres (mm)

#### 7.2.2 Determination of the width

The measurements of the width shall be conducted in accordance with the provisions set out in GB/T 6673-2001 in order to determine 10 isometric width measurements. The width limit deviation shall be determined by formula (2).

$$\Delta_w = w_{\min \text{ or } \max} - w_0 \dots\dots\dots(2)$$

in which,

$w_{\min \text{ or } \max}$  – The actual measured maximum or minimum width, in millimetres (mm)

$w_0$  – The nominal width, in millimetres (mm)

$\Delta_w$  – The width limit deviation, in millimetres (mm)

#### 7.2.3 Roll weight (mass) deviation

Remove the outer packaging of the cling wrap film and place the cling wrap film onto a pair of scales to weigh it. The roll net weight (mass) deviation shall be determined by formula (3):

$$\Delta G = \frac{G - G_0}{G_0} \times 100 \dots\dots\dots(3)$$

in which,

$G$  – The actual determined net weight of the roll, in grams (g)

$G_0$  – The nominal net weight of the roll, in grams (g)

$\Delta_G$  – The roll net weight (mass) deviation, percentage (%)

### 7.3 Appearance test

The appearance indexes for air bubbles, perforations, ruptures and unevenness shall be determined by performing a visual inspection under natural light.

The sizes of the impurities, fish eyes and lump blocks shall be determined with a tenfold magnifier, using the maximum length to calculate. The dispersion shall be determined with a frame-board of 10 cm x 10 cm.

### 7.4 Physical and mechanical properties

#### 7.4.1 Tensile strength and nominal tensile strain at break

The determination shall be conducted in accordance with GB/T 1040.3-2006. Two samples with a width of 10 mm and a gauge length of 50 mm shall be used. The test speed (no-load) is 500 mm/min  $\pm$  50 mm/min.

#### 7.4.2 Right angle tear strength

The determination of right angle tear strength shall be conducted in accordance with the provisions

set out in QB/T 1130-1991.

#### 7.5 Deviation of gas transmission rate

The determination of gas transmission rate shall be conducted in accordance with the provisions set out in GB/T 1038-2000. The deviation of the gas transmission rate shall be determined by formula (4):

$$\Delta Y = \frac{Y - Y_0}{Y_0} \times 100 \dots\dots\dots (4)$$

in which,

Y – The actual measured oxygen transmission rate, in cubic centimetres/(m<sup>2</sup>·24 hours atmospheric pressure) (cm<sup>3</sup>/(m<sup>2</sup>·24h·atm))

Y<sub>0</sub> – The nominal oxygen transmission rate, in cubic centimetres/(m<sup>2</sup>·24 hours atmospheric pressure) (cm<sup>3</sup>/(m<sup>2</sup>·24h·atm))

Δ<sub>Y</sub> – The deviation of the oxygen transmission rate, percentage (%)

The deviation of the carbon dioxide transmission rate shall be determined by formula (5):

$$\Delta R = \frac{R - R_0}{R_0} \times 100 \dots\dots\dots (5)$$

in which,

R – The actual measured carbon dioxide transmission rate, in cubic centimetres/(m<sup>2</sup>·24 hours atmospheric pressure) (cm<sup>3</sup>/(m<sup>2</sup>·24h·atm))

R<sub>0</sub> – The nominal carbon dioxide transmission rate, in cubic centimetres/(m<sup>2</sup>·24 hours atmospheric pressure) (cm<sup>3</sup>/(m<sup>2</sup>·24h·atm))

Δ<sub>R</sub> – The deviation of the carbon dioxide transmission rate, percentage (%)

#### 7.6 Deviation of water vapour permeance

The determination of the water vapour permeance shall be conducted in accordance with the provisions set out in GB/T 1037-1988, the deviation of the water vapour permeance shall be determined by formula (6):

$$\Delta H = \frac{H - H_0}{H_0} \times 100 \dots\dots\dots (6)$$

in which,

H – The actual measured water vapour permeance, in grams/(m<sup>2</sup>·24 hours) (g/(m<sup>2</sup>·24h))

H<sub>0</sub> – The nominal water vapour permeance in grams/(m<sup>2</sup>·24 hours) (g/(m<sup>2</sup>·24h))

Δ<sub>H</sub> – The deviation of the water vapour permeance , percentage (%)

#### 7.7 Light transmissivity and haze

The determination of light transmissivity and haze shall be conducted in accordance with the provisions set out in GB/T 2410-1980.

#### 7.8 Self-cling (shear and peel strength)

##### 7.8.1 Sample preparation

Cut 10 sheets of sample 50 mm long and 25 mm wide, with every two sheets forming a set. Place the adhesive sides of each set of samples face to face in a lap joint, the length of the lap joint being 15 mm and the width of the lap joint being 25 mm. Lay the samples on a smooth surface, use a rubber roller (diameter of 40 mm, length of 100 mm, mass of 300 g) and carry out reciprocation rolling and press on the lap joint three times, until there is no air left between the lap-jointed layers of cling wrap film. Leave the prepared samples in an environment under test conditions for 20 minutes and then conduct the test.

#### 7.8.2 Test method

Stretch out each set of the samples on a tension machine and determine the force needed to separate the two sheets of sample. The arithmetic mean value of the five sets shall be regarded as the result. The test instrument shall meet the provisions set out in GB/T 1040.3-2006 and the stretching velocity is  $250 \pm 50$  mm/min. The self-cling (shear and peel strength) shall be determined by formula (7):

$$T = \frac{P}{a \times b} \dots\dots\dots(7)$$

in which,

T – The self-cling (shear and peel strength), in Newton/centimetre<sup>2</sup> (N/cm<sup>2</sup>)

P – The force needed to separate the sample, in Newtons (N)

b – The width of the lap joint, in centimetres (cm)

a – The length of the lap joint, in centimetres (cm)

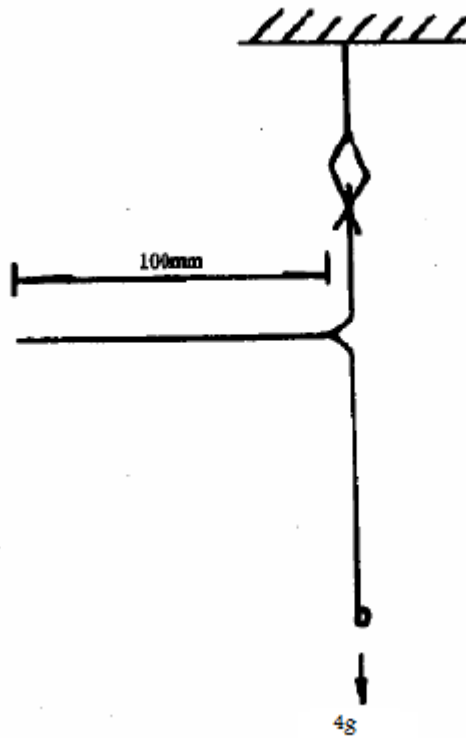
### 7.9 Determination of the open-wrapping

#### 7.9.1 Sample preparation

Cut 6 sheets of sample 150 mm long and 50 mm wide, with every two sheets forming a set. Place the adhesive sides of each set of samples face to face in a lap joint, the length of the lap joint being 100 mm. The processing and treatment methods are the same as specified in Section 6.9.1 [sic] of this Standard.

#### 7.9.2 Test method

Fix one end of the sample and at the other end of the sample fix a 4 g weight using the self-cling of the cling wrap film or a piece of adhesive paper. Let the weight down slowly and allow the sample to peel naturally. See Diagram 1 for the test schematic. All three sample sets should meet the property requirements.



#### 7.10 Determination of the anti-fogging

Add 200 ml of water at a temperature of  $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$  into each of three beakers with a volume of 1000 ml. Use three equal-sized pieces of cling wrap film, with the adhesive side facing down, to completely cover each of the beaker mouths. Ensure the film surfaces are flat, and put the three beakers into a low temperature tank at  $3^{\circ}\text{C}$  to maintain a constant temperature. After 10 minutes, check the adhesive state of the water drops on the surface of the cling wrap film. All three samples should meet the property requirements.

#### 7.11 Hygienic property

When the material is polyethylene, the test shall be conducted in accordance with GB/T 5009.60.

When the material is polyvinylchloride, the test shall be conducted in accordance with GB/T 5009.67.

When the material is polyvinyl dichloride, the test shall be conducted in accordance with GB/T 17030.

For cling wrap film made of other plastic materials, the test shall be conducted in accordance with the analysis methods set out in hygienic standards for products made of the corresponding materials.

### 8 Inspection rules

#### 8.1 Group lot

The acceptance check for the products shall use the lot as the unit. Products which are made of the same grade material have the same specifications, the same formula and have been continuously

produced. One lot shall not exceed 10,000 rolls.

## 8.2 Inspection classification

### 8.2.1 Factory inspection

The factory inspection items are appearance, dimensional specification, tensile strength, nominal tensile strain at break and self-cling.

### 8.2.2 Type inspection

The type inspection items are all the items specified in the technical requirements. Type inspections must be conducted at least once a year.

## 8.3 Sampling plan

### 8.3.1 Dimensional deviation, appearance

Adopt the normal double sampling plan specified in GB/T 2828.1-2003. The Inspection Level (IL) shall be the general inspection level II, the Acceptance Quality Limit (AQL) shall be 6.5, see Table 6 for detailed samples and decision arrays. Each roll is regarded as one sample unit.

Table 6 Sampling number and decision method

Unit: Roll

Lot size	Sample	Sample size	Cumulative sample size	Acceptance number (Ac)	Rejection number (Re)
26 ~ 50	First sample	5	5	0	2
	Second sample	5	10	1	2
51 ~ 90	First sample	8	8	0	3
	Second sample	8	16	3	4
91 ~ 150	First sample	13	13	1	3
	Second sample	13	26	4	5
151 ~ 280	First sample	20	20	2	5
	Second sample	20	40	6	7
281 ~ 500	First sample	32	32	3	6
	Second sample	32	64	9	10
501 ~ 1200	First sample	50	50	5	9
	Second sample	50	100	12	13
1201 ~ 3200	First sample	80	80	7	11
	Second sample	80	160	18	19
$\geq 3201$	First sample	125	125	11	16
	Second sample	125	250	26	27

### 8.3.2 Physical and mechanical properties

Take any roll from the extracted samples to carry out the inspection.

### 8.3.3 Hygienic properties

Take any roll from the extracted samples to carry out the inspection.

## 8.4 Determination rules

### 8.4.1 Determination for conforming items



The determination of the appearance and dimensional deviation for the sample unit shall be conducted in accordance with Section 5.3, 5.4 respectively. If the inspection results of the sample unit meet the specifications prescribed in Table 1, then the appearance and the dimensional deviation shall be determined as conforming items.

In the case of any nonconforming physical or mechanical property, a double-sized sample shall be extracted from the original lot to re-inspect each of the nonconforming items. The items cannot be regarded as conforming until the re-inspection results are all qualified; otherwise they shall be determined as nonconforming.

When there is any nonconforming item existing in the hygienic properties, then the hygienic properties shall be determined as nonconforming.

#### 8.4.2 Determination for conforming lots

When all of the inspection results for appearance, dimensional deviation, physical and mechanical properties and hygienic properties conform, then the lot can be regarded as a conforming lot.

### 9 Packaging labels, packaging, transport and storage

#### 9.1 Packaging labels

The packaging box (bag) shall be marked with the following information:

- a) Product name;
- b) Product quantity and specifications;
- c) Name and trademark of the manufacturer;
- d) Production date and expiry date;
- e) Product material and species;
- f) The specific name and chemical structure of each additive;
- g) The nominal values of the oxygen transmission rate, carbon dioxide transmission rate and water vapour transmission rate;
- h) The nominal value of the roll net weight;
- I) The words “for food use”;
- j) Warnings or other explanations;

#### 9.2 Packaging

##### 9.2.1 Inner packaging

Use film bags or racked boxes as sealed packaging.

##### 9.2.2 Outer packaging

Cardboard boxes or other suitable packaging shall be selected for the outer packaging of the products.

#### 9.3 Transport

During the transportation of the product, attention must be paid to damp-proofing and protection from sunlight. During handling, the product must be carefully lifted up and put down and have no heavy loads placed on top of it.

#### 9.4 Storage

The product must be stored in clean, dry warehouses, must not come into contact with any corrosive

chemical substances and other harmful substances, the distance from any heat source shall be at least one metre and the reasonable storage duration shall be determined on the basis of the properties of the plastic cling wrap film. The storage duration must not exceed two years from the production date.